

FCC TEST REPORT

for

Acrox Technologies Co., Ltd.

Wireless Mouse

Model Number: ONA11HO087, ONNLS6400R
LS6400R,G1W

FCC ID: PRDMU25

Prepared for : Aprox Technologies Co., Ltd.
Address : 4F., No.89, Minshan St., Neihu Dist., Taipei City 114, ,
Taiwan, R.O.C

Prepared by : Keyway Testing Technology Co., Ltd.
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Report No. : 14KWE031192F

Date of Test : Mar. 5~6, 2014

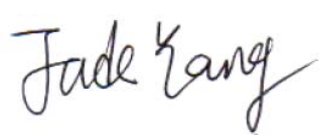

Date of Report : Mar. 6, 2014

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Keyway Testing Technology Co., Ltd.

Applicant:	Acrox Technologies Co., Ltd.		
Address:	4F., No.89, Minshan St., Neihu Dist., Taipei City 114, Taiwan, R.O.C		
Factor:	Acrox Technologies Co., Ltd.		
Address:	Xinmin Industrial, Changan Town, Dongguan City, Guangdong Province, China		
E.U.T:	Wireless Mouse		
Model Number:	ONA11HO087, ONNLS6400R, LS6400R,G1W		
Trade Name:	ONN, ACROX	Serial No.:	-----
Date of Receipt:	Mar.5, 2014	Date of Test:	Mar. 5~6, 2014
Test Specification:	FCC Part 15 Subpart C Section 15.249:2013 ANSI C63.4:2009		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
	Issue Date: Mar. 6, 2014		
Tested by:	Reviewed by:	Approved by:	
			
Andy Gao / Engineer	Jade Yang/ Supervisor	Chris Du / Manager	
Other Aspects:	None.		
Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.			

1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A
Radiated Emissions	15.209,15.249	PASS
20dB Bandwidth	15.249	PASS
Antenna Requirement	15.203	PASS

2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Description : Wireless Mouse
M/N : ONA11HO087, ONNLS6400R,
LS6400R,G1W
Power Supply : DC 3V (1.5V AAA Battery*2)
Operation Frequency : 2408~2474MHz
Modulation Technology : GFSK
Antenna Type : Integrated antenna
Antenna Gain : 0.5dBi

2.3. Independent Operation Modes

The basic operation modes are:

2.3.1. EUT work continues TX mode and frequency as below:

Channel	:	Frequency
Low	:	2408MHz
Middle	:	2440MHz
High	:	2474MHz

Note: New battery used for all test.

2.4. Difference between Model Numbers

Note: The products are all the same except the model number and trade name.

3. TEST SITES

3.1. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567-237
Date of registration: September 1, 2011

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

3.2. List of Test and Measurement Instruments

3.2.1. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	May 9,13	May 9,14
Bilog Antenna	ETS-LINDGREEN	3142D	135452	May 20,13	May 20,14
Spectrum Analyzer	Agilent	8593E	3911A04271	May 9,13	May 9,14
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	May 9,13	May 9,14
Signal Amplifier	SONOMA	310	187016	May 9,13	May 9,14
Horn Antenna	DAZE	ZN30701	11003	May 11,13	May 11,14
Signal Amplifier	DAZE	ZN3380C	11001	May 9,13	May 9,14
Signal Amplifier	Agilent	8449B	3008A00251	May 9,13	May 9,14
RF Cable	IMRO	IMRO-400	966 Cable 1#	May 9,13	May 9,14
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A

4. TEST SET-UP AND OPERATION MODES

4.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

4.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: Wireless Mouse)

Note: 1:By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Y axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report. Test data as below.

2:For all test, used new battery.

Frequency (MHz)	Axis	Field Strength (dBuV/m)	Antenna Polarization
2408	X	100.84	Vertical
2408	Y	101.72	Vertical
2408	Z	100.19	Vertical

4.3. Test Operation Mode and Test Software

None.

4.4. Special Accessories and Auxiliary Equipment

None.

4.5. Countermeasures to Achieve EMC Compliance

None.

5. EMISSION TEST RESULTS

5.1. Radiated Emission Test

5.1.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

5.1.2. Fundamental and harmonics emission limits

Fundamental Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
	mV/m	dBuV/m	$\mu\text{V}/\text{m}$	dBuV/m
902~928 MHz	50	94	500	54
2400~2483.5 MHz	50	94	500	54
5725~5875MHz	50	94	500	54
24.0~24.25GHz	250	108	2500	68

5.1.3. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.1.4. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

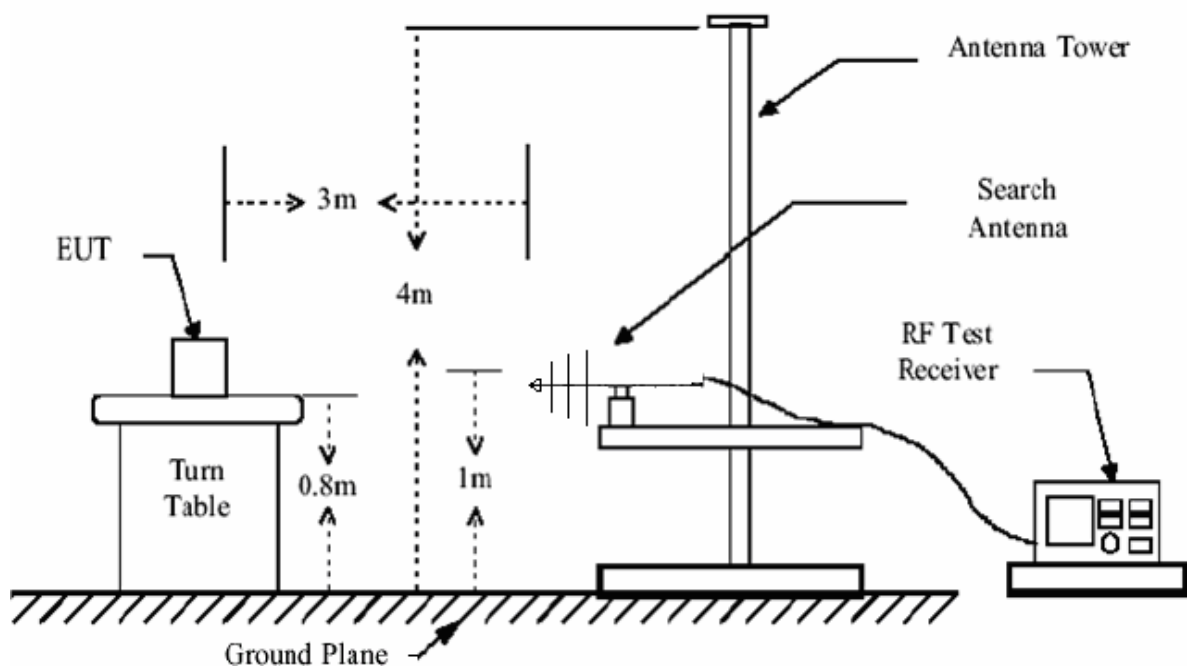
The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

The test data of the worst case condition(s) was reported on the following pages.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.



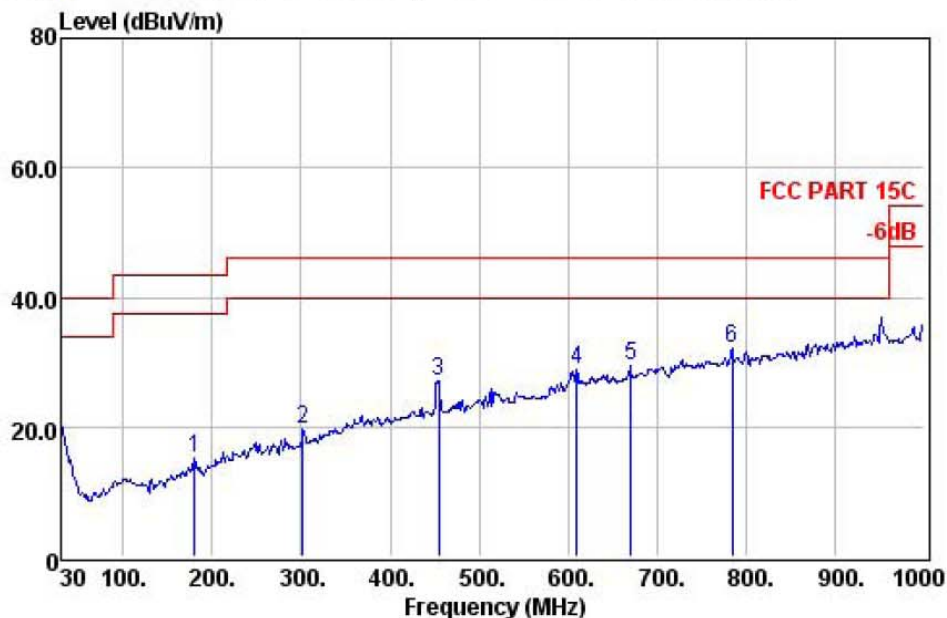
Test Data



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Data: 17 File: D:\966 data\14Report\复印件 14KW121416LC.EM6 (32)



Site : 966 Chamber
Condition: FCC PART 15C 3m 3142D VERTICAL
EUT : Wireless Mouse
M/N : ONA11H0087
Power : DC 3V
Test By : Andy
Comment : Temp:24.8'C Humi:56% Press:101.52kPa
Test Mode: TX Mode

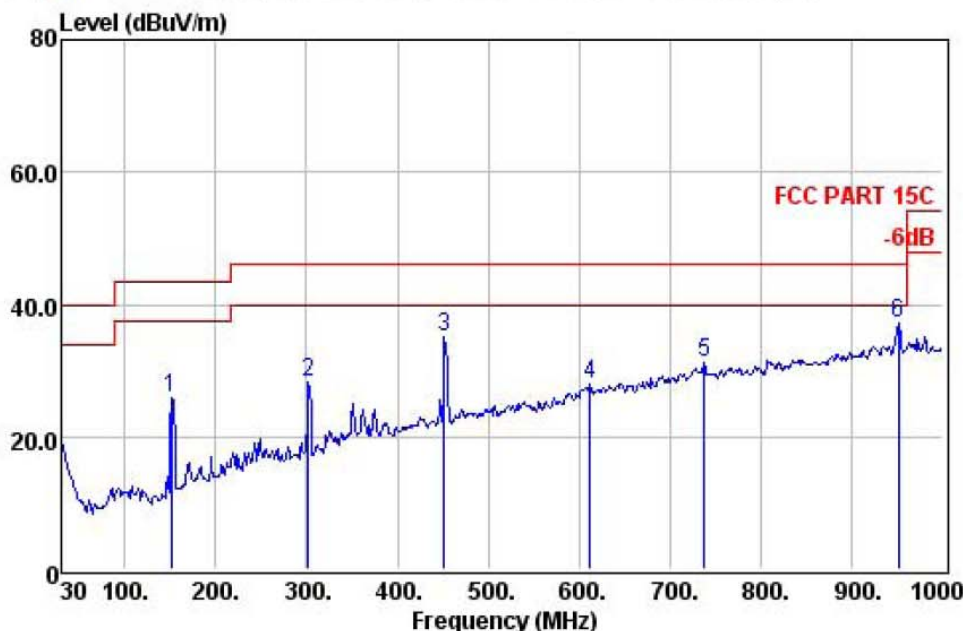
	Preamp	Read	Cable&Antenna		Limit	Over			
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	180.35	31.16	34.42	1.39	10.39	15.04	43.50	-28.46	QP
2	301.60	30.92	34.62	1.94	13.84	19.48	46.00	-26.52	QP
3	454.86	30.61	37.28	2.62	17.74	27.03	46.00	-18.97	QP
4	610.06	30.61	35.33	3.38	20.88	28.98	46.00	-17.02	QP
5	670.20	30.79	34.79	3.69	21.88	29.57	46.00	-16.43	QP
6	784.66	30.60	35.58	4.29	22.82	32.09	46.00	-13.91	QP



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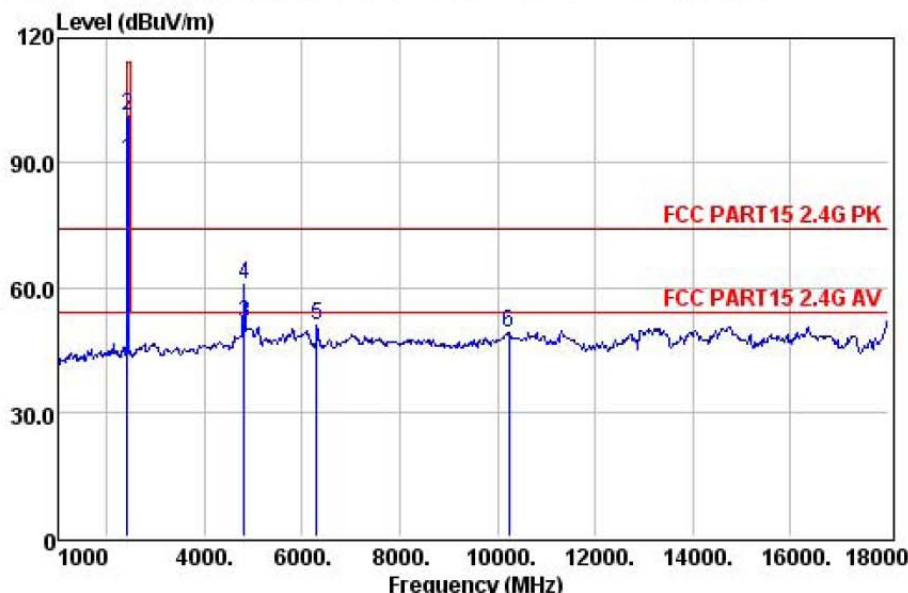
Site : 966 Chamber
Condition: FCC PART 15C 3m 3142D HORIZONTAL
EUT : Wireless Mouse
M/N : ONA11H0087
Power : DC 3V
Test By : Andy
Comment : Temp:24.8'C Humi:56% Press:101.52kPa
Test Mode: TX Mode

	Preamp	Read	CableAntenna	Limit	Over				
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	151.25	31.25	46.93	1.22	9.02	25.92	43.50	-17.58	QP
2	301.60	30.92	43.30	1.94	13.84	28.16	46.00	-17.84	QP
3	451.95	30.61	45.35	2.62	17.65	35.01	46.00	-10.99	QP
4	612.00	30.62	34.33	3.38	20.94	28.03	46.00	-17.97	QP
5	738.10	30.66	35.03	4.04	22.70	31.11	46.00	-14.89	QP
6	951.50	29.60	37.29	4.92	24.61	37.22	46.00	-8.78	QP



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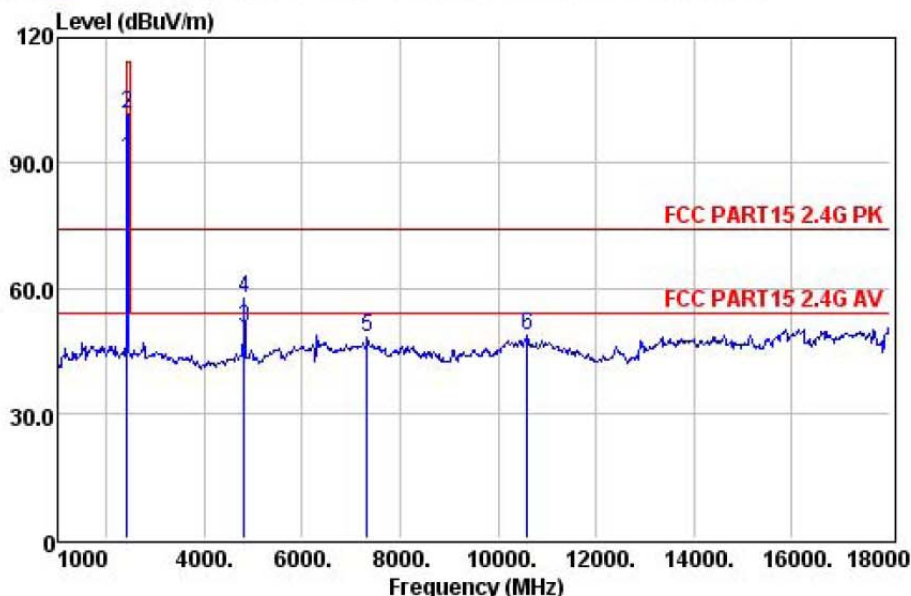
Site : 966 Chamber
 Condition: FCC PART15 2.4G PK 3m ZN30701 HORIZONTAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2408MHz

	Preamp	Read	Cable	Antenna	Limit	Over			
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2408.00	26.32	80.88	7.39	28.73	90.68	94.00	-3.32	Average
2	2408.00	26.32	91.62	7.39	28.73	101.42	114.00	-12.58	Peak
3	4816.00	27.49	33.65	12.01	32.94	51.11	54.00	-2.89	Average
4	4816.00	27.49	43.00	12.01	32.94	60.46	74.00	-13.54	Peak
5	6304.00	27.76	26.53	16.60	35.62	50.99	74.00	-23.01	Peak
6	10231.00	28.82	22.31	17.01	38.77	49.27	74.00	-24.73	Peak



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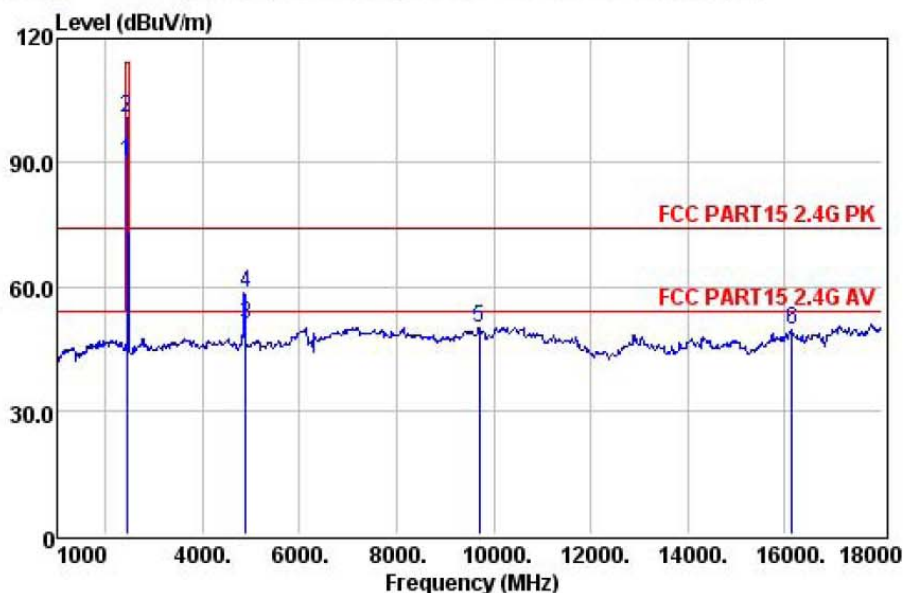
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 Condition: FCC PART15 2.4G PK 3m ZN30701 VERTICAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2408MHz

	Preamp	Read	Cable	Antenna	Limit	Over			
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2408.00	26.32	81.07	7.39	28.73	90.87	94.00	-3.13	Average
2	2408.00	26.32	91.92	7.39	28.73	101.72	114.00	-12.28	Peak
3	4816.00	27.49	33.03	12.01	32.94	50.49	54.00	-3.51	Average
4	4816.00	27.49	39.97	12.01	32.94	57.43	74.00	-16.57	Peak
5	7324.00	27.96	22.16	16.62	37.33	48.15	74.00	-25.85	Peak
6	10588.00	28.86	21.08	17.08	39.25	48.55	74.00	-25.45	Peak



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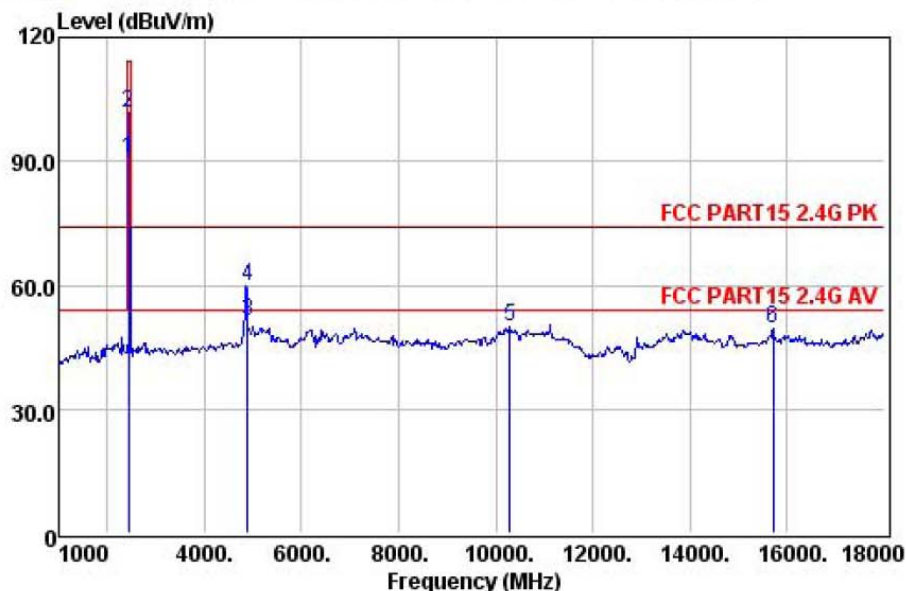
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 Condition: FCC PART15 2.4G PK 3m ZN30701 VERTICAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2440MHz

		Preamp	Read	Cable	Antenna	Limit	Over	
	Freq	Factor	Level	Loss	Factor	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2440.00	26.33	80.03	7.48	28.76	89.94	94.00	-4.06 Average
2	2440.00	26.33	90.96	7.48	28.76	100.87	114.00	-13.13 Peak
3	4880.00	27.53	33.11	12.14	33.11	50.83	54.00	-3.17 Average
4	4880.00	27.53	40.55	12.14	33.11	58.27	74.00	-15.73 Peak
5	9704.00	28.68	23.71	16.94	38.17	50.14	74.00	-23.86 Peak
6	16147.00	29.76	17.23	20.74	41.23	49.44	74.00	-24.56 Peak



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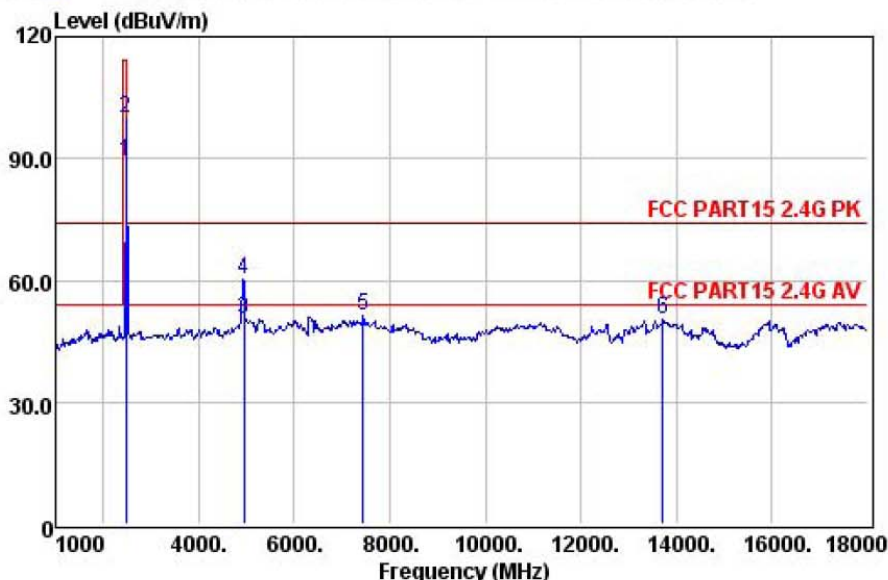
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 Condition: FCC PART15 2.4G PK 3m ZN30701 HORIZONTAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2440MHz

	Preamp	Read	Cable	Antenna	Limit	Over			
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2440.00	26.33	80.72	7.48	28.76	90.63	94.00	-3.37	Average
2	2440.00	26.33	91.73	7.48	28.76	101.64	114.00	-12.36	Peak
3	4880.00	27.53	33.36	12.14	33.11	51.08	54.00	-2.92	Average
4	4880.00	27.53	41.89	12.14	33.11	59.61	74.00	-14.39	Peak
5	10282.00	28.83	22.95	17.02	38.85	49.99	74.00	-24.01	Peak
6	15705.00	29.66	19.37	20.44	39.19	49.34	74.00	-24.66	Peak



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Data: 31 File: D:\966 data\14Report\复件 14KW121416LC.EM6 (32)



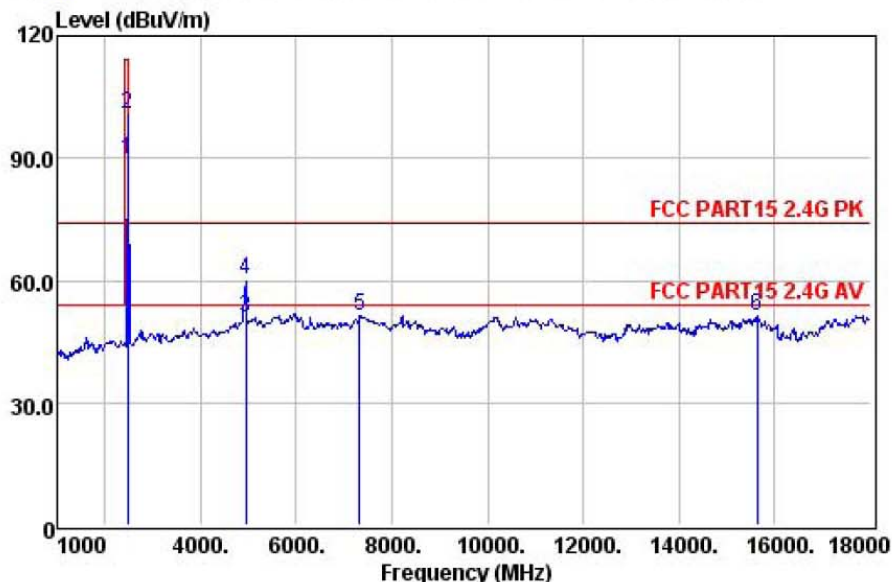
Site : 966 Chamber
 Condition: FCC PART15 2.4G PK 3m ZN30701 HORIZONTAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2474MHz

	Preamp	Read	CableAntenna	Limit	Over				
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2474.00	26.34	79.37	7.52	28.79	89.34	94.00	-4.66	Average
2	2474.00	26.34	89.95	7.52	28.79	99.92	114.00	-14.08	Peak
3	4948.00	27.57	32.34	12.32	33.28	50.37	54.00	-3.63	Average
4	4948.00	27.57	42.41	12.32	33.28	60.44	74.00	-13.56	Peak
5	7443.00	27.99	25.16	16.62	37.38	51.17	74.00	-22.83	Peak
6	13716.00	29.34	17.42	19.04	43.22	50.34	74.00	-23.66	Peak



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Data: 32 File: D:\966 data\14Report\复件 14KW121416LC.EM6 (32)



Site : 966 Chamber
 Condition: FCC PART15 2.4G PK 3m ZN30701 VERTICAL
 EUT : Wireless Mouse
 M/N : ONA11H0087
 Power : DC 3V
 Test By : Andy
 Comment : Temp:24.8'C Humi:56% Press:101.52kPa
 Test Mode: TX 2474MHz

	Preamp	Read	CableAntenna	Limit	Over				
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2474.00	26.34	79.70	7.52	28.79	89.67	94.00	-4.33	Average
2	2474.00	26.34	91.00	7.52	28.79	100.97	114.00	-13.03	Peak
3	4948.00	27.57	33.00	12.32	33.28	51.03	54.00	-2.97	Average
4	4948.00	27.57	42.39	12.32	33.28	60.42	74.00	-13.58	Peak
5	7324.00	27.96	25.39	16.62	37.33	51.38	74.00	-22.62	Peak
6	15637.00	29.65	21.76	20.41	38.92	51.44	74.00	-22.56	Peak

6. 20DB OCCUPY BANDWIDTH

6.1. Limits

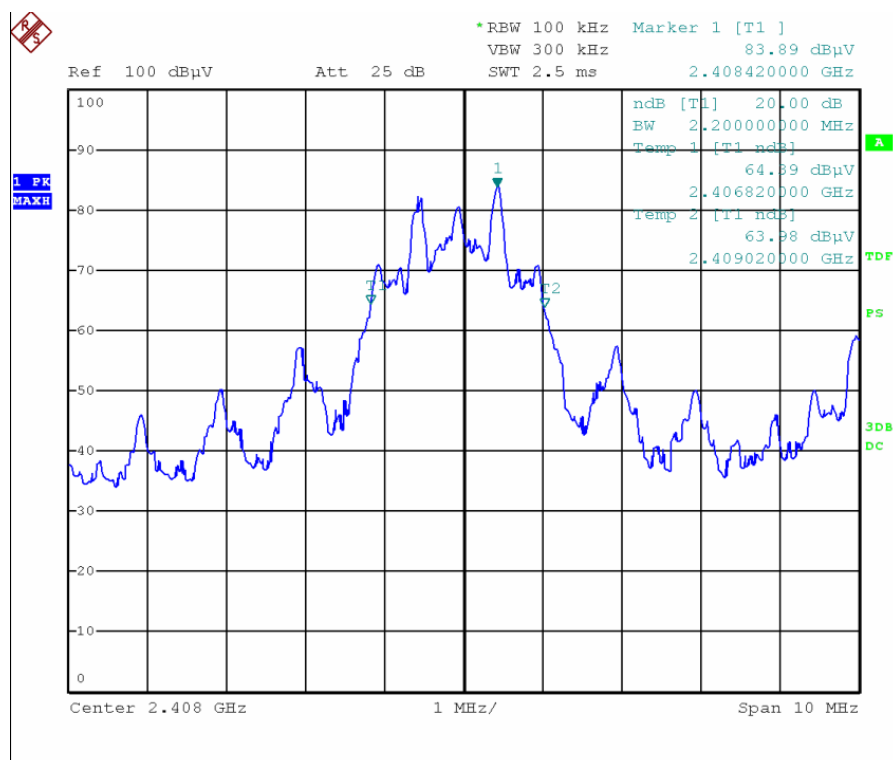
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test data:

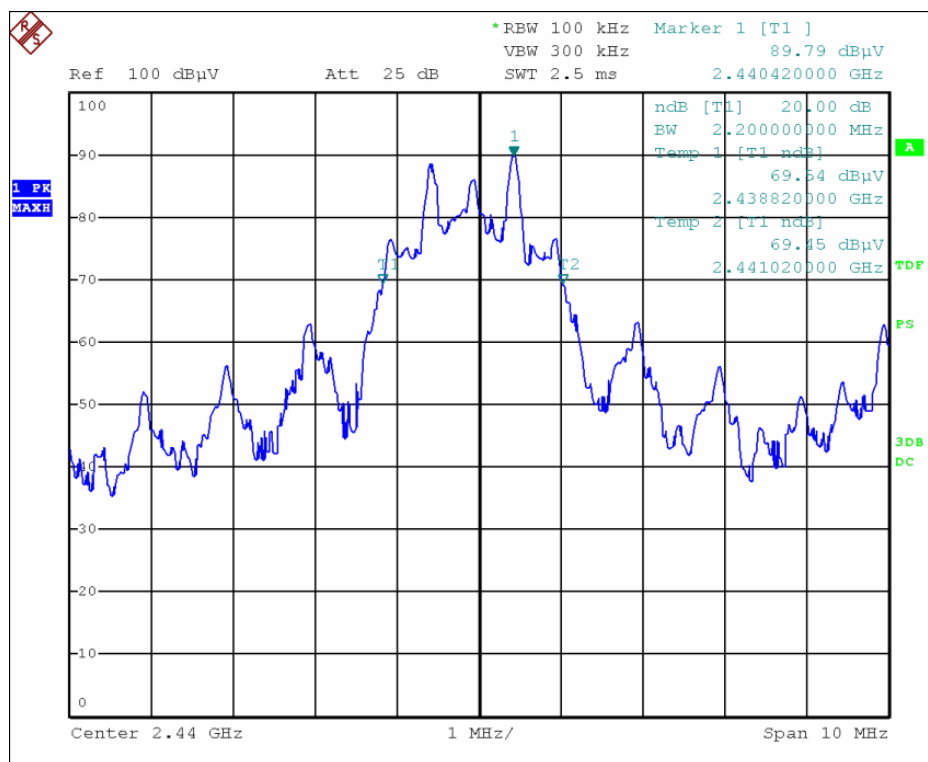
Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)
2408	2.20	N/A
2440	2.20	N/A
2474	2.20	N/A

Test plot as follows:

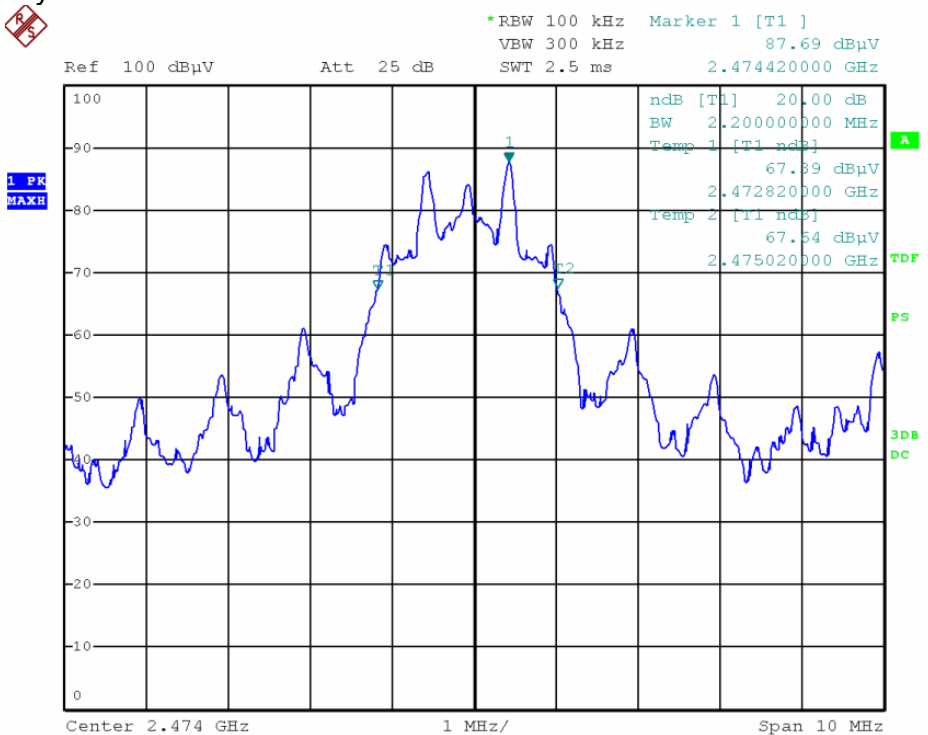
Test Frequency: 2408MHz



Test Frequency: 2440MHz



Test Frequency: 2474MHz



7. BAND EDGE COMPLIANCE TEST

7.1. Limits

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

7.2. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure.

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

Test plot as follows:

Test data:

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)	Band edge Limit (dBuV/m)	
			PK	AV
<2400	H	51.23	74.00	54.00
<2400	V	50.61	74.00	54.00
>2483.5	H	51.84	74.00	54.00
>2483.5	V	50.57	74.00	54.00

8. ANTENNA REQUIREMENT:

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
<p>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
E.U.T Antenna:	
<p>The antenna is Integral antenna, the best case gain of the antenna is 0.5dBi</p>	

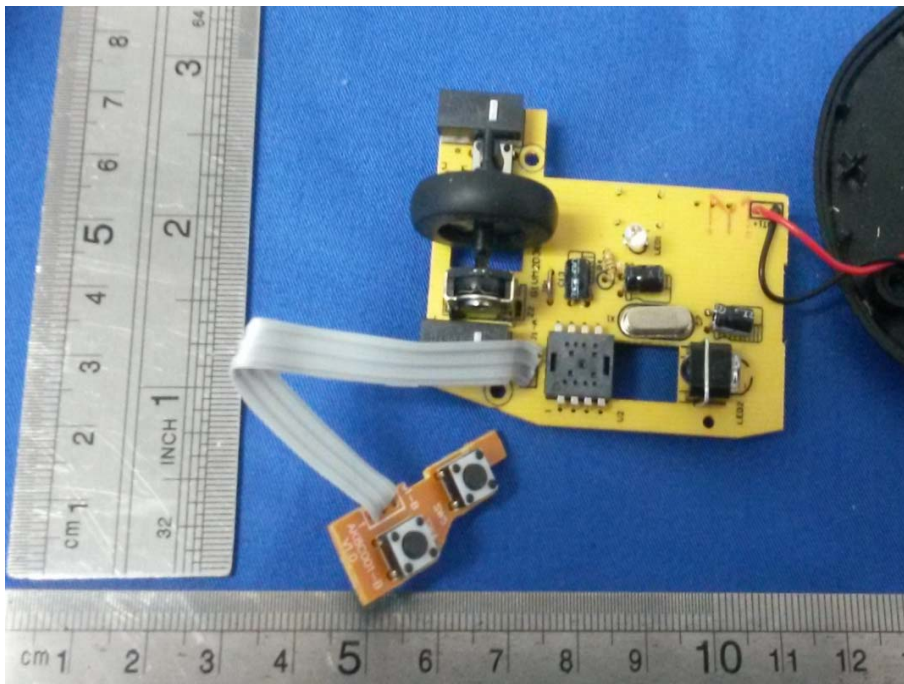
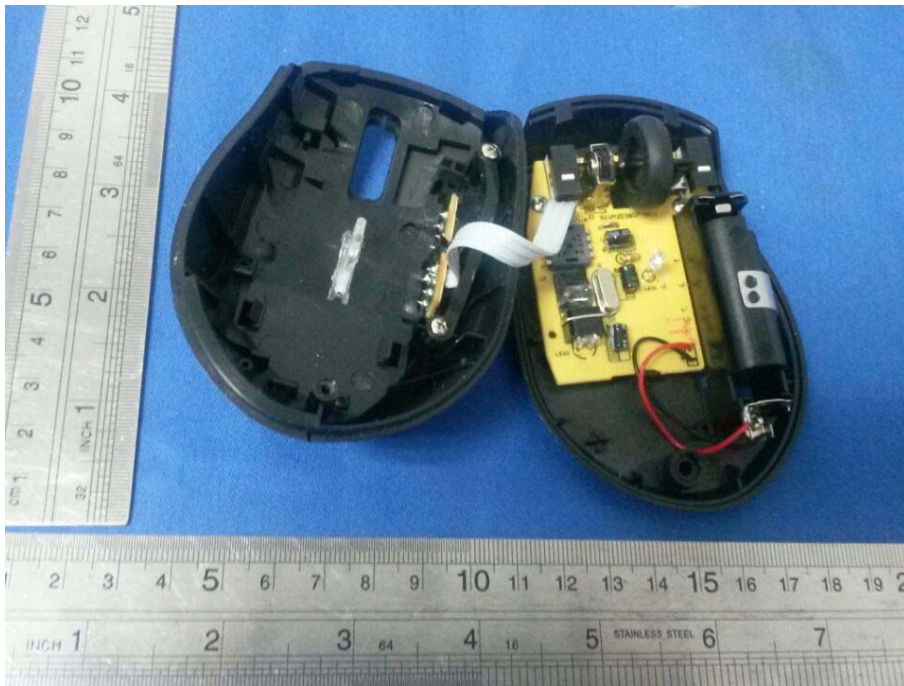
9. PHOTOGRAPHS OF TEST SET-UP

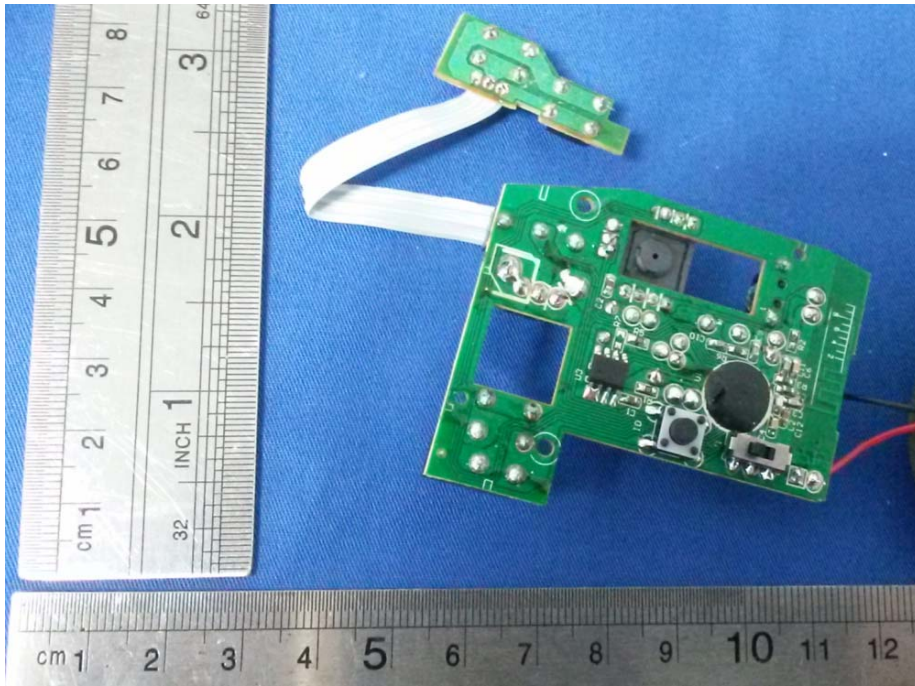
Radiated Emission



10. PHOTOGRAPHS OF THE EUT







END.